REMARKS/ARGUMENTS

Claims 1-18 are pending in the application. The Applicant hereby requests further examination and reconsideration of the application in view of these remarks.

In paragraph 1 of the office action, the Examiner rejected claims 1-18 under 35 U.S.C. 103(a) as being unpatentable over Doshi in view of Shinomiya. For the following reasons, the Applicant submits that all of the pending claims are allowable over the cited references.

Claims 1 and 10

According to method claim 1, one or more demands for service in a mesh network are received, which network comprises a plurality of nodes interconnected by a plurality of links. Each of the one or more demands is mapped onto a primary path and a restoration path in the network to generate at least one path plan for the one or more demands in the network. The at least one path plan is generated as a function of (a) one or more cost criteria associated with the at least one path plan and (b) a failure-related cross-connection criterion associated with the path plan.

In rejecting claim 1, the Examiner stated, in paragraph 2, that Doshi discloses generating at least one path plan as a function of (a) one or more cost criteria associated with the at least one path plan, citing Doshi's Algorithm L on page 71, item 3 and Tables IX and X, and (b) cross-connection criterion associated with the path plan, citing Doshi's Table IV and Column 1 on page 77. For the following reasons, the Applicant submits that the Examiner mischaracterized the teachings of Doshi in rejecting claim 1.

Doshi discloses methods for provisioning demands in a mesh network, where each provisioned demand has a primary (service) route and a restoration (alternate) route. See, e.g., page 63, column 1, Problem 2 (joint optimization). Doshi formulates the problem for joint optimization on pages 67-68. As described starting on page 67, column 2, last line, when provisioning a set of demands, the objective function to be minimized is the sum of the weighted capacity requirements for all of the links in the entire network. Doshi refers to this minimized objective function as the "total weighted capacity requirement." See, e.g., page 68, column 2, lines 15-16.

Doshi formulates the joint optimization problem as the total weighted capacity requirement subject to ("s.t.") five different constraints, identified on page 68, column 2 as Constraints (2)-(6). None of these constraints, including the minimized objective function (1) itself, has anything to do with <u>the number of cross-connects</u> anywhere in the network.

On pages 69-72, Doshi describes four different algorithms for solving the joint optimization problem formulated on page 68. The Examiner cited Algorithm L on pages 70-71 as teaching the generation of at least one path plan as a function of one or more cost criteria associated with the at least one path plan. That may well be true. Significantly, however, <u>nothing</u> in Algorithm L has anything to do with generating a path plan as a function of any criterion related to <u>the number of cross-connections</u>, let alone a <u>failure-related</u> cross-connection criterion.

According to the Examiner, Doshi discloses a cross-connection criterion in Table IV and Column 1 on page 77. The Applicant submits that this constitutes a mischaracterization of the teachings in Doshi. These citations do <u>not</u> teach the use of a cross-connection criterion as an <u>input</u> in generating a path plan. Rather, these citations refer to the maximum number of cross connections at a node that <u>result</u> from the

generation of a path plan based on Doshi's algorithms. Thus, in Doshi, the maximum number of cross connections at a node is not an input to Doshi's algorithms, it is an output from those algorithms.

The Examiner has improperly concluded that Doshi's discussion of the maximum number of cross connections at a node that results from the implementation of an algorithm that generates a path plan as a teaching of the use of a cross-connection criterion as an input to such an algorithm. The Examiner's statement that Doshi teaches the generation of a path plan as a function of both (i) one or more cost criteria and (ii) a cross-connection criterion constitutes a mischaracterization of the teachings in Doshi.

The Applicant submits that the Examiner's rejection of claim 1 based on this mischaracterization of Doshi renders the rejection of claim 1 improper and requests that the rejection be withdrawn. For similar reasons, the Applicant submits that the Examiner's rejection of claim 10 is also improper and should be withdrawn. As such, the Applicant submits that claims 1 and 10 are allowable over the cited references. Since each of the remaining claims depends directly or indirectly from one of claims 1 and 10, it is further submitted that the remaining claims are also allowable over the cited references.

Claims 2 and 11

According to claim 2, the at least one path plan is generated by calculating (1) a first set of one or more path plans that satisfy the one or more cost criteria and (2) a second set of one or more path plans that satisfy the failure-related cross-connection criterion. A determination is made as to whether the first and second sets have any path plans in common. If not, then, until the first and second sets have at least one path plan in common, the one or more cost criteria are relaxed and the first set is recalculated.

Fig. 1 shows an exemplary embodiment of the invention of claim 2. According to this embodiment:

- Step 108 of Fig. 1 is an example of the calculation of the first set of path plans of claim 2;
- Step 112 of Fig. 1 is an example of the calculation of the second set of path plans of claim 2;
- Step 114 of Fig. 1 is an example of the determination of any path plans in common of claim 2; and
- Step 118 of Fig. 1 is an example of the recalculation of the first set of path plans with one or more relaxed cost criteria of claim 2.

In rejecting claim 2, the Examiner summarily concluded that the first two paragraphs of the section on page 72 entitled "Joint Optimization: Distributed Computation," "essentially suggest what the limitation requires." The Applicant submits that this rejection is woefully incomplete. In particular, the Examiner fails to identify with specificity which teaching in Doshi is an example of the step of calculating a first set of path plans that satisfy one or more cost criteria. The Examiner also fails to identify with specificity which teaching in Doshi is an example of the step of calculating a second set of path plans that satisfy a failure-related cross-connection criterion. Nor does the Examiner identify with specificity which teaching in Doshi is an example of determining whether the first and second sets have any path plans in common. Nor does the Examiner identify with specificity which teaching in Doshi is an example of relaxing one or more cost criteria and recalculating the first set if the first and second sets

have no path plans in common. The Applicant submits that the reason why the Examiner fails to identify any of these teachings with specificity is that they simply do not exist in the passage of Doshi cited by the Examiner.

Significantly, in rejecting claim 1, the Examiner admitted that "Doshi fails to expressly disclose a failure-related cross-connection criterion associated with the path plan." It is hard to understand how the Examiner can now cite Doshi as teaching such a failure-related cross-connection criterion.

The Applicant submits that this provides additional reasons for the allowability of claim 2 and similarly of claim 11 (and therefore claims 3-4 and 12-13, which depend from claims 2 and 11, respectively) over the cited references.

<u>Claims 5 and 14</u>

According to claim 5, the at least one path plan is generated by calculating (step (a)) a set of node-disjoint path pairs for the one or more demands based on the failure-related cross-connection criterion, wherein a node-disjoint path pair is calculated for each demand. Primary and restoration paths are identified (step (b)) for each node-disjoint path pair in the set to generate a path plan for the one or more demands. A determination is made (step (c)) as to whether the path plan satisfies the failure-related cross-connection criterion. When the path plan satisfies the failure-related cross-connection criterion, the path plan is saved (step (d)). Steps (a)-(d) are repeated (step (e)) to generate two or more path plans that satisfy the failure-related cross-connection criterion. One of the path plans is selected (step (f)) based on the one or more cost criteria.

Fig. 2 shows an exemplary embodiment of the invention of claim 5. According to this embodiment:

- Step 206 of Fig. 2 is an example of step (a) of claim 5;
- Step 216 of Fig. 2 is an example of step (b) of claim 5;
- Step 218 of Fig. 2 is an example of step (c) of claim 5;
- Step 220 of Fig. 2 is an example of step (d) of claim 5; and
- The loop of steps 216, 218, and 220 being repeated in Fig. 2 as an example of step (e) of claim 5.

In rejecting claim 5, the Examiner cited Doshi, page 75, column 2, last 2 paragraphs, as teaching calculating a set of node-disjoint pairs for one or more demands based on a failure-related cross-connection criterion. The Applicant submits that the Examiner mischaracterized these teachings in Doshi.

According to the invention of claim 5, the set of node-disjoint pairs calculated in step (a) are used in step (b) to identify primary and restoration paths that are part of a path plan. Step (c) then determines whether the path plan of step (b) satisfies the failure-related cross-connection criterion. Steps (d), (e), and (f) identify a number of path plans that do satisfy the failure-related cross-connection criterion and then select one of those "satisfying" path plans based on the one or more cost criteria. Thus, in the invention of claim 5, step (a) is implemented <u>before</u> a path plan is selected. In fact, step (a) is a necessary pre-requisite to the selection of such path plan in the invention of claim 5.

The cited teachings in Doshi, on the other hand, refer to processing that is implemented after a path plan for a set of demands has been generated. According to Doshi, if a generated path plan has one or more nodes with too many cross-connection requests, then certain channels can be prewired, thereby essentially bypassing the node. This is very different from calculating a set of node-disjoint pairs as one step in a sequence of steps leading up to the generation of a path plan. The Applicant submits that the Examiner has taken the teachings of Doshi out of one context (i.e., processing after the generation of a path plan) and arbitrarily inserted those teachings into a completely different context (i.e., processing leading up to the generation of a path plan).

According to step (e) of claim 5, steps (a)-(d) are repeated to generate two or more path plans that satisfy the failure-related cross-connection criterion. According to the Examiner, Doshi teaches this feature of claim 5 in Steps 2-4 of Appendix A. Here, too, the Applicant submits that the Examiner mischaracterized the teachings in Doshi.

First of all, Appendix A describes an optimization procedure that finds a restoration route for a single demand that already has a primary path. See first paragraph of Appendix A. It is not an algorithm that generates a path plan for a set of demands.

Furthermore, as explained previously, the Examiner admitted that Doshi does not teach generating path plans based on a failure-related cross-connection criterion. In particular, the optimization procedure described in Doshi's Appendix A has nothing to do with a failure-related cross-connection criterion. For example, none of the parameters defined in the first paragraph of Appendix A has anything to do with numbers of cross connections.

In addition, although it is true that Appendix A teaches "a loop," Doshi explicitly teaches in Appendix A that the loop is broken and processing is completed as soon as a restoration path is found. See, e.g., Step 3 ("Execute the search procedure for the restoration route for *k*. If one is found, the procedure is finished. We have found restoration routes for both *d* and *k*. Break the loop and stop."). See also Step 5 ("Execute the route search procedure again for *k*. If one is found, the procedure is finished. Break the loop and stop.") As such, Doshi's Appendix A cannot be properly interpreted as teaching the generation of two or more solutions, whether those solutions are restoration paths or path plans.

Thus, Doshi's optimization procedure in Appendix A fails to teach an example of step (e) of claim 5 on at least three different levels:

- o Doshi's optimization procedure finds a restoration path for a single demand, not a path plan for a set of demands;
- o Doshi's optimization procedure is independent of -- and not a function of -- any failure-related cross-connection criterion; and
- o Doshi's optimization procedure finds a single solution (i.e., a single restoration path), rather than multiple solutions (e.g., two or more path plans, as in claim 5).

For all these reasons, the Applicant submits that this provides additional reasons for the allowability of claim 5 and similarly of claim 14 (and also claims 6-9 and 15-18, which depend from claims 5 and 14, respectively) over the cited references.

Claims 6 and 15

According to claim 6, when the path plan satisfies the failure-related cross-connection criterion, steps (b)-(d) are repeated with a constraint that excludes each and every saved path plan. In this way, the invention of claim 6 is capable of finding two or more different path plans that satisfy the failure-related cross-connection criterion. Step 222 of Fig. 2 is an example of the constraint-related feature of claim 6.

In rejecting claim 6, the Examiner cited Steps 2-4 of Doshi's optimization procedure in Appendix A. As explained earlier, Doshi's optimization procedure terminates as soon as a single restoration path is found. Even if Doshi's solution (i.e., a restoration path) were an example of a path plan of claim 6, which the Applicant denies, the fact remains that Doshi does not teach or even suggest repeating any of the processing in the optimization procedure with a constraint that excludes each and every saved restoration path, because, as soon as a restoration path is identified, the loop is broken and no steps are repeated. Thus, Doshi cannot be said to teach an example of finding a solution and then repeating steps with a constraint that excludes each and every previously saved solution.

For all these reasons, the Applicant submits that this provides additional reasons for the allowability of claim 6 and similarly of claim 15 (and also claims 7 and 16, which depend from claims 6 and 15, respectively) over the cited references.

Claims 7 and 16

According to claim 7, steps (b)-(d) are repeated only until the path plan fails the failure-related cross-connection criterion. The "No" output of step 218 of Fig. 2 represents an example of the flow of processing when the path plan fails the failure-related cross-connection criterion.

In rejecting claim 7, the Examiner cited Doshi's page 75, column 2, last 2 paragraphs, and Appendix A as teaching the limitations of claim 7. Once again, the Examiner mischaracterized the teachings in Doshi.

First of all, the Examiner admitted that Doshi does not teach a failure-related cross-connection criterion.

Secondly, Doshi's Appendix A does not teach breaking a loop when a solution cannot be found (i.e., when a criterion is failed). Rather, as described earlier, Doshi's Appendix A teaches breaking a loop when a solution (i.e., Doshi's restoration path) is found.

Furthermore, the last two paragraphs in column 2 of Doshi's page 75 have absolutely nothing to do with repeating any steps and then terminating the repetition of those steps when a solution cannot be found. Rather, those paragraphs describe a technique for cross connection prewiring at each and every node in the network that requires such prewiring. The Examiner has not identified with any specificity which of Doshi's steps are the steps that get repeated and then terminated when a solution fails a criterion, let alone which steps get repeated and then terminated when a path plan fails a failure-related cross-connection criterion.

For all these reasons, the Applicant submits that this provides additional reasons for the allowability of claim 7 and similarly of claim 16 over the cited references.

Claims 8 and 17

According to claim 8, when the path plan fails the failure-related cross-connection criterion, steps (a)-(d) are repeated with a constraint that excludes each set of node-disjoint paths. Step 226 of Fig. 2 is an example of the constraint-related feature of claim 8.

In rejecting claim 8, the Examiner cited Doshi's page 75, column 2, last 2 paragraphs, and Appendix A as teaching the limitations of claim 7. Once again, the Examiner mischaracterized the teachings in Doshi.

First of all, the Examiner admitted that Doshi does not teach a failure-related cross-connection criterion.

Secondly, the Applicant does not understand how the passages cited by the Examiner teach repeating any steps with a constraint that excludes sets of node-disjoint paths. The Examiner is required to identify with specificity which teachings in Doshi correspond to the recited claim elements. In particular, where does Doshi teach the repetition of steps that correspond to the repetition of steps (a)-(d) of claim 8? Where does Doshi teach the repetition of steps with a constraint that excludes sets of node-disjoint paths? The Applicant submits that the passages cited by the Examiner simply do not teach such features.

For all these reasons, the Applicant submits that this provides additional reasons for the allowability of claim 8 and similarly of claim 17 (and also claims 9 and 18, which depend from claims 8 and 17, respectively) over the cited references.

Claims 9 and 18

According to claim 9, when calculating a set of node-disjoint path pairs for the one or more demands per step (a) fails to find a feasible solution, the failure-related cross-connection criterion is relaxed. In Fig. 2, if step 208 determines that step 206 did not find a feasible solution, then step 210 relaxes the failure-related cross-connection criterion. With step 206 being an example of step (a) of claim 9, steps 208 and 210 are examples of the other elements of claim 9.

In rejecting claim 9, the Examiner cited Doshi's page 80, column 1, last two paragraphs. Here, too, the Applicant does not understand how these teachings in Doshi can be interpreted as teaching the recitations of claim 9.

At most, the teachings in Doshi are related to calculating a set of node-disjoint path pairs for one or more demands.

Significantly, however, as before and as admitted by the Examiner, these teachings have nothing to do with a failure-related cross-connection criterion.

Secondly, these teachings have nothing to do with the relaxation of any criterion.

Furthermore, these teachings have nothing to do with failure to find a feasible solution.

For all these reasons, the Applicant submits that this provides additional reasons for the allowability of claim 9 and similarly of claim 18 over the cited references.

For the reasons set forth above, the Applicant respectfully submits that the rejections of claims 1-18 under Section 103(a) have been overcome.

In view of the above remarks, the Applicant believes that the pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Fees

During the pendency of this application, the Commissioner for Patents is hereby authorized to charge payment of any filing fees for presentation of extra claims under 37 CFR 1.16 and any patent application processing fees under 37 CFR 1.17 or credit any overpayment to Mendelsohn & Associates, P.C. Deposit Account No. 50-0782.

The Commissioner for Patents is hereby authorized to treat any concurrent or future reply, requiring a petition for extension of time under 37 CFR 1.136 for its timely submission, as incorporating a petition for extension of time for the appropriate length of time if not submitted with the reply.

Respectfully submitted,

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Customer No. 46850
Mendelsohn & Associates, P.C.
1500 John F. Kennedy Blvd., Suite 405
Philadelphia, Pennsylvania 19102

/Steve Mendelsohn/
Steve Mendelsohn
Registration No. 35,951
Attorney for Applicant
(215) 557-6657 (phone)
(215) 557-8477 (fax)